DIGITALLY ENHANCED CORDLESS TELEPHONE AS PART OF A MEDIA ACCESS CONTROL ADDRESS

The present invention relates to Ethernet networking addresses. More particularly, the present invention relates to map generation between a radio identifier (DECT ID) and an Ethernet address, to permit DECT usage in a WMTS or other Ethernet-connected cordless system.

Digital Enhanced Cordless Telecommunication (DECT), which originated as a European initiative, has become popular around the world to provide efficient wireless connectivity to many different types of applications, such as patient-wearable devices (PWD) in a Wireless Medical Telemetry System (WMTS). In wireless communications, there are devices that may operate under different protocols and communicate with an Ethernet LAN. In such a case, base stations or access points (AP's) have been known to translate from one protocol to another, such as from DECT to Ethernet. In particular, there is a need in the art for adapting between the DECT identity of a device and the Ethernet Media Access Control (MAC) address.

A DECT system comprises a DECT Fixed Part (FP) that utilizes one or more base stations or access points (APs), and at least one DECT cordless terminal or Portable Part (PP). DECT is virtually unlimited in the number of base stations and cordless terminals permitted. The DECT radio interface uses one or more of the ollowing: Time Division Multiple Access (TDMA), Time Division Duplex (DDD) and Multi Carrier, and features Dynamic Channel Selection and Allocation. The Dynamic Channel Allocation permits DECT to adapt itself to changing environmental conditions, as compared with fixed channel-allocation mechanisms.

As shown in Figure 1, a 10ms TMDA DECT frame 105 comprises 24 slots that are further divided into two groups 107, 108, each having 12 slots. The first twelve slots are for use in forward transmission by the base station (or Fixed Part) to the portable, whereas the other twelve slots are used for reverse transmission from the portable to the base station. One slot for transmission and one for reception is referred to as a "duplex pair." One frame, which is equal to 24 slots X 480 bits = 11,520 bits = 10ms@ 1,152,000 bits per second. Each particular slot, as shown by the enlarged slot 110 comprises 32 bits for synchronization 111, 64 for signaling 113 (actually 48 for data and 16 bits of CRC in the A-field), 4 groups of 80 bits each in the B-field 115 each comprises 64 bit data blocks each followed by 16 bits CRC.

However, although the WMTS described here uses a frame which has the same slot size (480 bits) as DECT, the number of slots per frame is 64 (as compared with the 24 slots of DECT). In order to permit DECT to be used for WMTS which uses Ethernet for its infrastructure, the prior art lacks a way of generating a map between a radio identifier (e.g. DECT ID) and an Ethernet network address.

The present invention provides a mapping between a 20-bit DECT PMID and an Ethernet MAC address by using a 1:1 mapping of the radio identifier and the low 20 bits of the Ethernet address. Each portable part calculates its PP ID from the bottom 20 bits of the unique Ethernet address assigned to it at the time of manufacture and each Fixed Part receives its FP ID when the Access Points start up and register with the Access Point Controller. The present invention also provides an extended DECT frame for use with WMTS devices by providing a frame that uses 64 slots.

Fig. 1 illustrates a standard 24 slot frame as used in DECT, and an enlarged view of the 480 bits that comprise a standard slot.

Fig. 2 illustrates the main parts of a DECT software module, as modified according to the present invention.

Fig. 3 illustrates an extended DECT frame for WMTS using a 64 slot frame according to the present invention.

The following description is presented for purposes of illustration and is not intended to limit the instant invention to those items shown and described. An artisan will appreciate that various modifications can be made to the instant invention that lie within the spirit of the invention and the scope of the appended claims.

Ethernet has its own unique device addresses generally known as MAC addresses or Ethernet addresses, and it was designed to ensure that no two machines would end up with the same Ethernet address. Moreover, to ensure the uniqueness of the addresses, the user does not have the capability to self-assign the addresses. Therefore, each controller using Ethernet comes with an address installed at the factory. To decrease the possibility that Ethernet addresses would run out, there are 48 bits allocated for address purposes. The present invention uses the lower 20 bits of the Ethernet address of each portable part (PP) to be mapped 1:1 with a radio identifier, such as a DECT identifier.

Fig. 2 shows the main parts of DECT software 200. The DECT software communicates with either an Access Point (AP) or PWD controller, identified by box 250. The DECT software comprises a boot loader 205 that loads the Digital Signal Processor

213. The DECT software also has a portable part (PP) or a fixed part (FP) application 210, and a DECT stack 215 that implements and manages connections between the portable part (PP) and fixed part (FP) applications. The boot loader 205 and PP or FP application are both in communication with the Patient Wearable Device (PWD) main board or Access Point main board 150. The DECT stack 215 has a slot controller that communicates with Digital Signal Processor (DSP) 213 and radio 217 used to transmit to the various wireless devices.

A standard DECT stack 215 supports 32 bits for device identifiers for connections between the PP and FP, with 20 bits being allocated to the PP ID and 12 bits being allocated to the FP ID. By extending the standard DECT frame for WMTS, it is possible for WMTS devices to use the DECT standard.

The Ethernet directly supports the sending of packets by using Medium Access Control (MAC) addresses in the source and destination fields of Ethernet packets. A procedure for mapping DECT PP or FP IDs to Ethernet MAC addresses is required to send datagrams. Radio module 217 would be used to transmit wireless communications to the PP's assigned to the PWD or Access Point 250.

One way that a DECT ID is mapped to an Ethernet address is by placing the 20-bits of the PP address of the radio identifier into the low-order 20 bits of an Ethernet address. The high-order 28 bits of the Ethernet address could be set to an agreed value in the WMTS system.

One result of the DECT addressing scheme is that the DECT stack limits the number of Access Points to 4096 (as 12 bits are allocated to the FP ID). When the Access Points start up and register with an Access Point Controller (APC) they will negotiate a unique set of FP IDs. The PP will calculate its PP ID from the 20 bottom bits of the Ethernet MAC address assigned to it from its manufacturing time. Thus the PPs effectively use the Ethernet MAC addresses and do not require a second set of addresses to be allocated.

The DECT stack 215 according to the present invention has been modified for use with WMTS by:

(1) The WMTS may use an extended DECT frame with 64 slots instead of the usual 24, in order to support a larger number of devices at lower data rate.

(2) The WMTS system may use a different number of RF carriers, and thus a different Primary Scan Carrier Number (PSCN) sequence.

(4) The WMTS may support mixed single and double slot bearers.

Fig. 3 illustrates an extended DECT frame for WMTS according to the present invention. The extended DECT frame comprises 64 slot periods, with the FP being capable of transmitting during slots 0-31 of the frame, and the portable part(s) being capable of transmitting during slots 32-63 of the frame. The slot controller, which is shown in Fig. 2 of the DECT stack, controls the slots, and the radio connections.

Various modifications may be made to the presently claimed invention that lie within the spirit of the invention and the scope of the appended claims. An artisan appreciates that the number of bits, whiled preferred to be the lower 20, could be a number higher or lower than that amount. The mapping, of course, would reflect the difference.